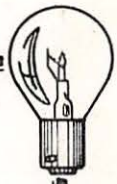

Double Filament Lamps

(WITHOUT SCREENS)

U·D· 210

Union Switch & Signal Co.
Swissvale, Pa.

Union Switch & Signal Co.

SWISSVALE, PA.

Subject: Double Filament Lamps (without screen)	Union Development
See U.D.211 for Double Filament Lamps with Screen. Also Instruction Pamphlet U-5037	Number: 210
	Date: March 22, 1935
	6.1 Sheets

With the cooperation of the Mazda Lamp manufacturers we have developed new double filament lamps which are believed to be superior in every way to the older type double filament lamps which had two filaments of equal rating as to voltage, wattage and life. In the development of the new lamps safety was the prime requisite while improvement in efficiency over the older type lamp was also an important consideration.

It was our endeavor in this development to produce lamps which would combine, as far as practicable, the advantages of both single and double filament lamps as previously furnished, and at the same time eliminate some of their disadvantages.

The problem of providing light-out protection has been attacked in several ways. One of these had been by the use of the earlier types of double filament lamps with two filaments of equal ratings connected in parallel. The theory was that due to inherent characteristics or incandescent lamps, one filament would probably outlast the other and that a burnout of one filament would be detected and the lamp replaced during periodic inspection by signal maintainers. This would be the case if it were not for the fact that when one filament fails the voltage applied to the other filament is increased due to less voltage

drop in the leads and connections, resulting in the failure of the second filament at practically the same time as the first filament. This condition was recognized and provision has been made for it in the new lamp by designing the secondary filament for a much longer theoretical average life at the rated voltage than the average rated life of the main filament. Thus, when the main filament fails the secondary filament is normally able, by its design, to withstand for a considerable period the resulting increase in applied voltage.

It is recognized generally that a single filament is more rugged mechanically, more concentrated, less subject to distortion and more efficient in light output, than a double filament of equal total wattage. It is obvious, therefore, that the best arrangement that can be provided in a double filament single contact lamp for railway light signaling is a lamp having a major portion of the light concentrated in a main filament located accurately at the focal point of the signal optical system, and having a minimum of wattage expended in a secondary filament located as near as practicable to the focal point. This arrangement has been incorporated in double filament lamps of the PS-16 bulb rebased type (Fig. 1) for use in Styles R, P and HC-2 signals, the S-11 bulb single contact bayonet candelabra base type (Fig. 2) for use in searchlight and highway crossing signals and in the G-16½ bulb single contact bayonet candelabra base lamp for use in Style L signals.

Tests and experiments made during development of these lamps indicated that a practical minimum of 3.5 watts at the rated voltage of the lamp was required for the secondary filament. This rating will provide a short range emergency indication, -

approximately 1500 ft. - sufficient to avoid train stops when the main filament fails. At the same time the change from the normal indication to the short range reserve indication can be readily distinguished. This gives a definite warning in the event of failure of the main filament and should enable replacement of defective lamps to be made before failure of their secondary filaments.

The double filament lamps are finding an increasing usage in highway crossing signals where a burnout of the filament of the lamp in one unit where single filament lamps are used, changes the aspect from that of two alternating flashing units to a single flashing unit which is confusing to some motorists. Burnout of the main filament of a lamp in signals where double filament lamps are used, decreases the range of the one unit but affords some protection against an entirely dark unit.

In the PS-16 bulb new type double filament lamps, the main filaments have been made the same wattage and shape as the filaments of corresponding single filament lamps. This was done so that roads now using single filament lamps can change to the new double filament lamps without change in the main signal indication and roads using the old type double filament lamps can obtain an improved indication with only slight increase in current taken by the lamp, or by burning the lamps at a lower voltage obtain the same indication and the benefit of the light-out protection afforded by the secondary filament at about the same current consumption.

The secondary filament of the PS-16 bulb lamp is V-shaped with the apex of the "V" downward. The "V" shape allows for maximum concentration. This secondary filament, when the lamp is in the

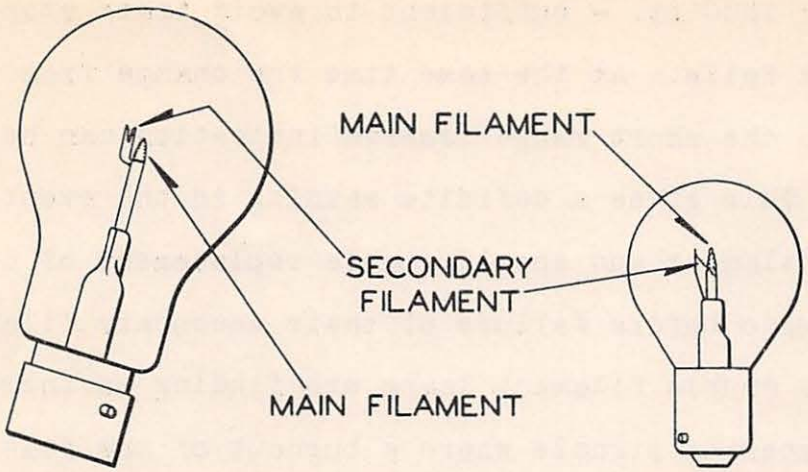

Fig. 1 - Double Filament Lamp, PS-16 bulb.

Fig. 2 - Double Filament Lamp, S-11 bulb.

signal, is located approximately on the axis of the lens system, as near as practicable to the main filament and on the side of the main filament farthest from the lens (See Fig.3). This arrangement provides for the best alignment and distribution of the light beam.

In the S-11 bulb new type double filament lamps, it was originally necessary to compromise between the wattage taken by the higher wattage lamps and that taken by the lower wattage lamps in assigning a wattage rating to the main filament in order to obtain the advantages that accrue when production is limited to a few types and those types made in quantity. The merit of this policy has been demonstrated in this case as the performance of the original S-11 bulb double filament lamps has been exceptional, since it was first introduced. Recently a lamp of low wattage rating has been added for use where primary batteries supply the power and conservation of power is important.

The secondary filament of the S-11 bulb lamp is a straight filament known as a C-12 type. The straight filament is necessary for manufacturing reasons and works out very satisfactorily in the

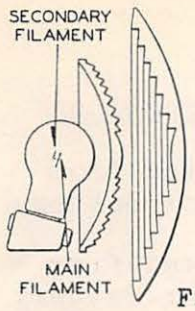

Fig. 3

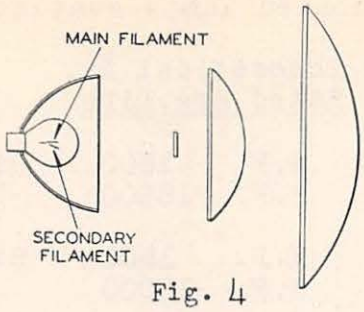

Fig. 4

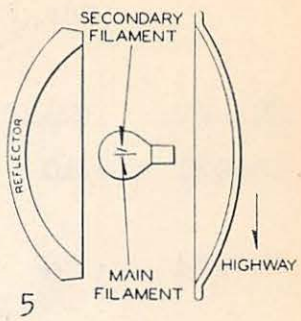

Fig. 5

Diagrams showing proper locations of main and secondary filaments with respect to lenses and reflectors.

searchlight and highway crossing signals, because of the use of reflectors in these signals in which a source of light nearly parallel to the axis of the reflector is most efficient.

In the searchlight signal the secondary filament is located below the main filament and causes the beam from the secondary filament to point slightly downward for a short range indication (See Fig. 4). In the highway crossing signals the secondary filament is located on the side of the signal away from the highway, so that the beam from the secondary filament points toward the highway (See Fig. 5).

The G-16½ bulb lamp for use in Style L Signals has a 29-watt main filament the same as the single filament lamp and a 6.5 watt secondary filament. The 6.5 watt filament is necessary in order to obtain a satisfactory indication with the comparatively dense colors used in this signal.

Ordering Instructions:

Until such time as these lamps are properly cataloged, orders may be placed by referring to Piece Numbers and descriptions given in the following lists.

The PS-16 bulb rebased lamps available are:

Po. No.	Volts	Watts	Theoretical Av. Rated Hrs.Life		Application
184971	10	M.F.18 S.F.3.5	M.F. S.F.	1500 15000	Signals lighted from A.C. or Stor.Battery
184972	8	M.F.18 S.F.3.5	M.F. S.F.	1500 15000	Signals lighted from A.C. or Stor.Battery
189825	10	M.F.30 S.F. 6	M.F. S.F.	1500 15000	Signals where deflecting or spredlite coverglass is used.
189826	8	M.F.10 S.F.3.5	M.F. S.F.	1500 15000	Signals lighted from Prim.Battery

The S-11 bulb, single contact bayonet candelabra base lamps available are:

159440	8	M.F.13 S.F.3.5	M.F. S.F.	1000 15000	Signals lighted from A.C. or 4 cells Stor.Battery
182814	10	M.F.13 S.F.3.5	M.F S.F.	1000 15000	Signals lighted from A.C. or 5 cells Stor.Battery
191859	11.3	M.F.14.4 S.F.3.5	M.F. S.F.	1000 12000	Signals lighted from A.C. or 6 cells Stor.Battery
192057	8	M.F.5.0 S.F.3.5	M.F. S.F.	1000 10000	Signals lighted from Prim.Battery

The G-16½ bulb lamp available is:

184970	6	M.F.29 S.F.6.5	M.F. S.F.	3000 30000	Style L Signals

We are now in a position to furnish the new lamps on orders and also will be glad to furnish samples with both filaments connected and with the main filament disconnected to facilitate observation of the difference in indication when the secondary filament only is connected.

H. H. Cadwallader 4/2/35.

CONFIDENTIAL INFORMATION

REMOVE RED SLIP
if this portion of the description
is sent outside of our organization

The following railroads have adopted as standard one or more of the new type double-filament PS-16 bulb rebased lamps.

Pce.No.	Rating
184971	10 volts 18 plus 3.5 watts
184972	8 Volts 18 plus 3.5 watts
189825	10 Volts 30 plus 6 watts
189826	8 Volts 10 plus 3.5 watts

O.S.L.	M.K. & T.	C.B. & Q.
P.R.R.	Ill.Term.	Ind.Un. Term.
Sou.Pac.	Gr.Tr.West.	C.C.C. & St. L.
N.C. & St.L.	C.R.R. of N.J.	N.Y.O. & W.
C.M.St.P.& P.	I.C.	T. & N.O.
L.& N.	N.Y.C.(West.)	Chi.Gr.West.
Union Pac.	Cin.Un.Term.	Chi.& East.Ill.
C.R.I. & P.	A.T.& S.F.	Northwest Pac.
		Long Island

The following railroads have adopted as standard one or more of the new type double filament S-11 bulb single contact bayonet candelabra base lamps.

Pce.No.	Rating
159440	8 Volts, 13 plus 3.5 watts
182814	10 Volts, 13 plus 3.5 watts
191859	11.3 Volts, 14.4 plus 3.5 watts
192057	8 Volts 5 plus 3.5 watts

So. Pac.	A.T.& S.F.	P.R.R.
Un. Pac.	C.M.St.P. & P.	N.Y.O. & W.
Erie	Gr.Tr. West.	C.R.I. & P.
		C.B. & Q.

W. H. Caldwallader 4/2/35